

【発表者について】アンダーラインは本学教員、研究員および技術職員、○は発表者、※は大学院生、卒研究生または卒業生

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	Study of Actual Road Fuel Efficiency Improvement Method for Small Passenger Cars using Traffic Flow Simulation
	○Glenn Hizkia Argy※, Yiqi Qu※, <u>Akira Kato</u>
	<p>Fuel efficiency and exhaust emissions of vehicles are determined by test cycles. Due to various road environments and climates, CO2 emissions on actual roads are different to the regulated values. Furthermore, conducting the test on actual road takes a lot of time and cost. Therefore, we aim to build a simulation that can calculate the fuel consumption and exhaust emissions of vehicles on actual roads. In this study, by combining MATLAB/Simulink and traffic flow simulation (SUMO), actual road driving is reproduced, evaluate and analyze the fuel consumption prediction accuracy in the actual road, and present a fuel consumption improvement method.</p> <p>MATLAB/Simulink was used to construct a vehicle model based on the actual vehicle used in test cycle and actual road driving test. The vehicle model constructed in MATLAB/Simulink is 2011 Honda Fit, which was used in previous experiment and conducted in test cycles, which are 10・15 Mode, JC08, and WLTC (Low, Medium, High), and actual driving test in three different driving modes such as urban, rural, and highway around Utsunomiya City. The accuracy of the vehicle model was verified by comparing the fuel consumption result between simulation and experiment.</p> <p>Traffic flow simulation SUMO was used to construct the actual driving test route and road environment. In order to compare with the result of the previous experiment, The Utsunomiya City map downloaded from OpenStreetMap (OSM) was used in this study as the driving route of the simulation. The fuel consumption is calculated by combining SUMO with the vehicle model built in MATLAB/Simulink. The vehicle speed generated by SUMO is input to the vehicle model of MATLAB/Simulink as the target speed command. The vehicle model can drive according to the target speed and calculate the fuel consumption.</p>